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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR AUGUST 1936

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J. W. FOLSOM

Justus Watson Folsom, entomologist in the Division of Cotton Insect Investigations, died at the Vicksburg, Miss., infirmary on September 24, after an illness of several weeks following heart attacks.

Dr. Folsom was born at Cambridge, Mass., on September 2, 1871. He received the degree of bachelor of science in 1895 and that of doctor of science in 1899 from Harvard University. For 1 year (1899-1900) he was professor of natural science at Antioch College, Yellow Springs, Ohio. In 1900 he went to the University of Illinois as instructor in entomology. He was associate in entomology from 1906 to 1908 and assistant professor from 1908 to 1923. He came to the Bureau of Entomology in 1925 as associate entomologist. During his entire service in this Bureau he was located at the Tallulah, La., laboratory of the Division of Cotton Insect Investigations.

Dr. Folsom was interested in many phases of entomology and his publications include papers on anatomy, physiology, embryology, and ecology of insects. He had an international reputation as an authority on Collembola and Thysanura and published numerous systematic papers on these groups. Much of his earlier economic work was with alfalfa insects. During recent years his economic studies have been devoted to cotton insects. His text-book, "Entomology with special reference to its ecological aspects", has been widely used during the past 25 years. The fourth revision, published in 1934, was revised by Professor R. A. Wardle, and appeared under the joint authorship of Folsom and Wardle.

Dr. Folsom was a Fellow in the American Association for the Advancement of Science and in the Entomological Society of America. He was president of the latter association during 1931. He was a member of the American Association of Economic Entomologists, serving as vice-president during 1932, being the chairman of the Cotton States branch. He was also a member of the Ecological Society of America and of the Cambridge Entomological Club, serving as president of the latter organization in 1900. Many of the well-known entomologists of the United States were among his students at the University of Illinois.

F. S. STICKNEY

F. S. Stickney, associate entomologist on the staff of the Bureau laboratory at Whittier, Calif., Division of Fruit Insect Investigations, died on August 15, as a result of a heart attack 2 days previously. Mr. Stickney was born at Wilson, N. C., August 6, 1892, His early training was received in North Carolina and Hawaii. He received the degree of B. S. from the University of California in 1916, his M. S. from the University of Illinois in 1918, and his Ph. D. from the same institution in 1921. He also carried on special advanced study at Stanford University. During the World War he served for about a year in the Sanitary Corps. In 1921 Mr. Stickney undertook a study of the Parlatoria and other date scales for the Federal Horticultural Board, in connection with eradication projects in the Coachella Valley. This work was later carried on under the Bureau of Entomology and was broadened into a general study of date insects and mites, a manuscript on which was nearly complete at the time of his death. With the discontinuance of the investigations on date insects and mites, Mr. Stickney was transferred to work on the citrus red scale in California. He had a special interest in the morphology of the Coccidae and in the reactions of insects to different temperatures and humidity. Mr. Stickney's untimely death is a serious loss to the Bureau and to the profession. A widow, Elizabeth Gaylord Stickney, and three children survive.

FRUIT INSECT INVESTIGATIONS

Parasite of woolly apple aphid well distributed in Yakima and Wenatchee Valleys.--E. J. Newcomer, of the Yakima, Wash., laboratory, reports that Aphelinus mali Hald. was introduced into the Yakima and Wenatchee Valleys a few years ago for the control of the woolly apple aphid, which is of special importance in connection with the perennial canker disease of apple. In the Wenatchee district Aphelinus was found in July 1936 in a small, isolated orchard area about 10 miles from the main orchard section. It was also found in the only commercial orchard between these two areas and in an abandoned orchard between the areas. The country in between is mostly desert. All of these places are along the Columbia River, below Wenatchee. So far as known, no introductions of parasites were made in any of these places, except in the main orchard section. In the Yakima district a rather brief survey of the orchard area within a radius of 20 miles of Yakima in August 1936, indicates that Aphelinus is distributed throughout this area. Many orchards examined were several miles from sites of introductions made by this laboratory. Some introductions have been made by growers, but it is evident that the parasite spreads rapidly. In at least two instances, introductions made into one or two trees a year ago have spread over 20 acres or more, and in one locality the parasite is so numerous that material is being obtained for shipment elsewhere. A remarkable example of the ability of this parasite to disperse itself was discovered late in August 1936. Along the highway from Yakima to Hood River there is an isolated apple tree. This tree was examined, and considerable numbers of parasitized woolly aphids were found on it. The tree is at least 10 miles from any commercial orchard, with a range of hills between.

Life history of Blapstinus rufipes Casey.--C. K. Fisher, of the dried-fruit insect laboratory at Fresno, Calif., reports that in the rearing work with B. rufipes the food given adults and larvae was whole kernels of wheat soaked in water until soft. The eggs were laid in a glass dish, the bottom of the dish being covered with blotting paper. Larvae and pupae were held in glass vials in which a moist atmosphere was provided by introducing moistened strips of blotting paper. Five females, confined with five males, produced 230 eggs, of which 76 percent hatched. The incubation period ranged from 3 to 8 days, the larval period from 40 to 45 days (5 records), and the pupal period was 5 days (3 records). The rearings were made in an incubator. The temperature ranged from 80° to 102° F., but was usually about 90°.

Sprays for protection of early ripening tree fruits from Japanese beetle attack.--W. E. Fleming and F. E. Baker, of the Moorestown, N. J., laboratory, state that during the season 12 series of tests, involving 1,320 cages, 264,000 beetles, and 3,600 sprayed plants, were completed and information obtained on approximately 100 spray materials and combinations. These studies were conducted in the laboratory under controlled conditions of temperature, relative humidity and light in special glass cages, as previously described by Fleming and Baker (Jour. Agr. Research 48:115-130; 49:39-44. 1934). They found that Cracca with a rotenone content of 1.7 percent was only about one-fourth as effective as a repellent as derris having a rotenone content of from 4 to 5 percent. Cube and Timbo with a rotenone content and total extractives equivalent to derris were only half as effective as repellents. The impregnation of derris with rosin to increase the resistance of the deposits to removal by water or decomposition by light significantly reduced the value of the derris as a repellent, while the addition to the rosin of a small quantity of cresol, beta naphthol, thymol, quinine, or naphthalene appeared to overcome the detrimental effect of the rosin. The addition of red, orange, yellow, green, blue, violet, and black dyes with the rosin used to impregnate the derris did not modify the repellency of the derris. Impregnation of derris with cumar, coal tar, or gilsonite improved the resistance to removal by water and decomposition by light but completely destroyed the value of the material as a repellent. The impregnation of derris with pine products--pine oil, pine pitch, pine tar, or dipentene--improved the resistance of derris to removal by water and decomposition by light but completely destroyed the value of the material as a repellent. The addition of Bordeaux mixture appeared to decrease the repellency of derris. Sulphur increased the resistance of derris to removal by water and decomposition by light, while sulphur alone had no repellent value. Lime sulphur likewise increased the resistance of derris to removal by water and decomposition by light, although lime sulphur alone, or in combination with aluminum sulphate, copper sulphate, iron sulphate, or zinc sulphate, was neither toxic nor repellent to the beetles, the addition of these materials to derris definitely increased the effectiveness of derris as a repellent and greatly reduced the removal of the repellent substance by water. In connection with studies of different arsenical sprays, they found that two commercial acid lead arsenates, practically identical in chemical composition, differ widely in their insecticidal and repellent values, the "micronized" sample being 1.42 times more effective as an insecticide and reduced the amount of feeding by the beetle to 22 percent of that on the "ordinary" commercial acid lead arsenate. Apparently the size of the arsenical particles is an important factor governing the effectiveness of acid lead arsenate for the Japanese beetle. The addition of ferric oxide to acid lead arsenate sprays to prevent injury to foliage of shade trees reduced the insecticidal value of the arsenical 50 percent, while at the same time the feeding by the beetles on the sprayed foliage increased from 1.50 to 2.74 times, depending upon the amount of ferric oxide present. Basic zinc arsenate proved to have no value as a stomach poison or as a repellent against the beetle.

Development of immature stages retarded during the summer of 1936.--T. N. Dobbins, Moorestown, submits a summary of the relative proportion of the various stages of the Japanese beetle represented in the soil population by 10-day periods during August 1935 and 1936. Earlier results of this work were reported in the News Letter for July 1936 (vol. III, no. 9).

Period	Percentage frequency of--						
	Eggs	Larval instars			Prepupae	Pupae	Adults
		1st	2d	3d			
1935							
August 1-10---	28.4	59.6	11.7	0	0	0	0.2
August 11-20---	11.5	48.9	39.6	0	0	0	0
August 21-31---	1.7	31.5	64.6	2.2	0	0	0
1936							
August 1-10---	43.5	48.2	5.3	1.3	0	0	1.7
August 11-20---	19.7	39.9	40.3	0	0	0	0
August 21-31---	1.7	48.9	46.4	3	0	0	0

MEXICAN FRUIT FLY CONTROL

No Anastrepha ludens trapped.--Field operations on the Mexican fruit fly project were uninterrupted by inclement weather throughout the month of August, except for the last few days. During the last week this area received exceptionally heavy rains which have materially benefited the present fruit crop. Apparently the groves are in better condition at present than at any time within the last few years. Almost nine thousand traps were kept in operation throughout the month without taking any *Anastrepha ludens* Loew, either in the groves or the brushlands. There were trapped, however, 22 *A. serpentina* Wied., 2 *A. acidusa* Walk., and 325 *A. pallens* Coq. Very few larvae and no adults were taken from the border cities of Matamoros and Reynosa, Mexico.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Migration of Camnula pellucida Scudd.--L. P. Rockwood, Forest Grove, Oreg., reports that a mass migration of *C. pellucid* was observed on July 26 and 27 in the Upper Klamath Marsh in Klamath County. Grasshoppers were flying in a steady stream from the southeast over ground that was still too wet to traverse, in the central part of the marsh, and were invading five or six sections of good grassland on the western side of the marsh where serious damage had already been done to the marsh grazing (particularly to Juncus) over parts of two or three sections. Bunching was observed on egg beds in the invaded area and there will probably be several large 1936-37 egg beds in this area which in 1935-36 had only a few small scattered beds. C. pellucida from the original egg beds on the invaded area were still mostly in stages 3, 4, and 5, with very few teneral adults, as the hoppers did not begin to hatch here (on ground that was mostly still wet on June 25) until June 12. This was a month later than the beginning of hatching on the drier bench lands on the eastern side of the marsh whence the migrating grasshoppers originated. The only large area of egg beds found on the eastern side of the marsh in 1935-36 was on the eastern side of Little Wocus Bay, 5 miles south-southeast on an air line from the point of observation on the western side. Here egg beds in 1935-36 had been numerous and heavily populated over an area of from 15 to 20 acres. When this area was visited on July 27 it was found that large numbers of C. pellucida were leaving and flying off over the wet land to the northwest. There is no doubt that this egg bed area was the source of the invading swarm that was damaging grasslands on the western side of the marsh 4 or 5 miles away. The migrating individuals of C. pellucida were observed to average considerably larger and were brighter in color, particularly the bright yellow males, than the scattered individuals that originated on the small, widely scattered egg beds on the eastern side of the marsh a few miles north of Little Wocus Bay. The difference in color is probably not sufficient to constitute a migratory phase but strongly suggests an approach to that phenomenon.

Corn injured by white grubs in southern Wisconsin.--According to T. R. Chamberlin and Lee Seaton, Madison, Wis., considerable injury to corn by white grubs has been reported in southern Wisconsin but investigations in Dane, Rock, and Walworth Counties showed this injury to be very spotted and badly injured fields to be relatively scarce. On August 7 and 8, in Rock and Walworth Counties only four of the many fields examined showed conspicuous injury. Digging in damaged fields gave averages of approximately 5 to 8 stage-3 grubs per plant. From the field showing an average of 8 grubs per plant many grubs had already been removed by skunks whose diggings were found at almost every damaged hill. Most of the damaged plants had no growing roots left and had stopped growth at heights of from 1 to 4 feet. It is estimated that 50 percent of this field of approximately 10 acres was ruined by August 8. It was easily separable into approximate halves, one almost totally ruined and the other not or but slightly injured. The ruined portion was planted on land which had been in barley the preceding season, whereas the uninjured portion was on plowed sod land that had contained much alfalfa and clover last season when there was a major flight of the beetles. Doubtless the clover and alfalfa had had a beneficial effect on the soil and aided plant growth, but diggings showed only 2.375 grubs per hill in that part of the field and no skunks had been digging there. These observations agree with those of many previous workers and indicate that beetles do not oviposit heavily in alfalfa and clover. The drought undoubtedly retarded the normal growth of the corn. One tall green plant growing in rich soil and not suffering from lack of moisture showed 17 stage-3 grubs at its base. Part of the roots were eaten away but no effect was yet evident on the plant above ground. Another field of about 40 acres in Walworth County was estimated as being from 30 to 40 percent ruined by grubs. This corn was also planted on land that had been in barley the year before.

Phyllophaga tristis Fab. develops rapidly in the laboratory.--Messrs. Chamberlin and Seaton state that an egg of P. tristis, dug in the field on June 11 and incubated in the laboratory, had produced a pupa by August 24, that is to say in the short period of 2 months and 13 days.

Wheat varieties susceptible to hessian fly dominate tests in California.--W. B. Cartwright, Sacramento, Calif., reports that 170 wheat varieties from a field test of 300 at Birds Landing, Calif., were susceptible to hessian fly. This number represents the minimum on which sufficient data are collected to warrant their elimination from further tests.

Strains of wheat resistant to hessian fly and wheat joint worm.--E. T. Jones, Manhattan, Kans., states that analysis of hessian fly infestation and rust-infection data, taken from a large series of spring and winter wheat crosses, has shown lines of F_4-generation winter-habit hybrids of Marquillo x Oro, Kawvale, Minturki, and Tenmarq to be resistant, or segregating for resistance, to stem rust. Some very promising rust-resistant and fly-resistant selections of these wheats have been made for fall planting in cooperation with plant breeders. Infestation records for 145 winter-hardy fly-resistant selections of Marquillo winter wheat hybrids from Springfield, Mo., indicate that a number of strains may be resistant to wheat joint worm. The data of the following table show no correlation to exist between resistance to wheat joint worm and resistance to hessian fly.

Cross (F_4 generation)	Lines examined	Lines infested with H. tritici	Plants infested by spring-brood hessian fly: In lines infested by H. tritici	Plants infested by spring-brood hessian fly: In lines not infested by H. tritici
	Number	Percent	Percent	Percent
(Kan. x Hd. Fed.) x Marquillo	6	33	2.5	2
Minturki x Marquillo	11	46	11.0	30
Marquillo x Oro	16	56	26.0	9
Marquillo x Minturki	50	70	44.0	32
Kawvale x Marquillo	28	71	23.0	27
Marquillo x Tenmarq	35	97	22.0	0

Contrasting infestations in wheat varieties to joint worm in 1936 tests.--W. B. Cartwright also reports that in a series of 300 varieties grown at Birds Landing, a more perfect synchronization of the joint worm oviposition period with the wheat varieties heading in the period April 5 to April 25 was noted. The trend of joint worm infestations for varieties heading for this period was 40 percent, as compared with 3 percent for the period May 5 to May 15. However, 14 varieties deviated significantly from the trend, a fact of interest in that host selection and inherited resistance or susceptibility may also be issues along with plant growth and period of heading of these varieties. Six of the most contrasted infestations are given in the following table.

Variety	Expected trend of plant infestation	Recorded plant infestation
	Percent	Percent
Ramona	40	0
Reward	40	89
Canadian Red	13	80
Early Blackhull	13	64
Oakley	3	50
Java	3	41

Planting date in relation to egg deposition.--Morris Schlosberg and Ralph Mathes, Toledo, Ohio, report that in a series of ten weekly plantings of Spanish Gold, Tendergold, Howling Mob, Golden Cross Bantam, and Country Gentleman sweet corn, from May 1 to July 3, at Toledo in 1936, records of egg deposition by the European corn borer revealed the occurrence of second-generation moths in important numbers on the basis of resultant egg deposition on the later planted corn. No second-generation occurrence was recorded in 1935 in a similar series of plantings of 3 strains of sweet corn, although records of slight second-generation pupation in that season were available from other sources, such as in general occurred in previous seasons. It is noteworthy that second-generation pupation was confined to the earlier plantings. Of the total number of eggs recorded during the season (8,036), 69.62 percent (5,595) were laid by first-generation moths and 30.38 percent (2,441) by second-generation moths. The seasonal occurrence of egg deposition by either brood of moths was sharply delimited, that of the first generation extending from approximately June 14 to July 23, and that of the second generation from approximately August 1 to August 24. The peak of egg deposition by the first-generation moths occurred during the week of July 6 to 13, and that of the second-generation moths during the week of August 10 to 17. The seasonal range of egg deposition by the first-generation moths was approximately normal for the Toledo district, although beginning and ending approximately 2 weeks earlier than in 1935. The largest egg masses were laid during midoviposition in the case of both generations. Egg deposition by the first-generation moths was confined almost entirely to the earlier plantings, and that of the second generation to the later plantings. A slight overlapping of first- and second-generation egg deposition occurred on the midseason plantings. Considering egg deposition by both generations of moths, the plantings of May 1, 8, and 15 received 53.47 percent of the total number of eggs laid. The trend of resultant egg populations was downward from early to later plantings, with slight increases in the plantings of June 12 and June 19 over those of May 22, May 29, and June 5, owing to second-generation egg deposition.

Rate of sweet-corn tillering in relation to resultant borer population and ear injury.--A study of the relation of tillering in sweet-corn plants to borer infestation and survival rates was undertaken in 1936 with a single strain of sweet corn, as a supplementary aid in interpreting the results obtained in studies of sweet-corn resistance to the European corn borer. Three rates of tillering were observed, namely, one, two, and three tillers per plant. The required condition of tillering was obtained by eliminating undesired tillers as soon as they appeared. The tiller treatments were tested in quadruplicate in a Latin-square arrangement, with the outside rows protected by buffer rows. To insure uniform conditions of infestation, natural infestation was supplemented with hand infestation of the plants at a rate of two egg masses per plant, the egg masses containing, on an average, 30 eggs. Data were taken from a total sample of 40 plants of each treatment. Records were taken of natural egg deposition, resultant borer populations from both natural and hand egg infestations, and resultant injury to the ears. Data relating to the development of the plants were also taken, consisting of plant-height measurements during the season, tasseling records, and silking records. These data show that the higher rates of tillering were associated with higher resultant rates of egg deposition and borer survival and higher resultant plant populations, but with fewer injured ears as a result of absorption of a large portion of the plant population by the tillers. The data are summarized in the following table.

Plants in sample	Tillers per plant	Total borers in sample	Total borers in--			Total ears in sample	Ears in-jured	Ears in-jured
			Main stem	Tillers	Ears			
Number	Number	Number	Percent	Percent	Percent	Number	Number	Percent
40--	0	376	82.71	--	17.29	126	63	50.0
40--	1	348	64.94	23.57	11.49	132	42	31.8
40--	2	404	53.96	40.59	5.45	138	36	26.1
40--	3	424	45.28	50.24	4.48	143	25	17.5
Plants having								
One or less tillers--		362	73.82	11.79	14.39	129	52	40.3
Two or more tillers--		414	49.62	45.42	4.96	140	30	21.4

Effectiveness of insecticides against European corn borer in seed-beet plants.--D. D. Questel, New Haven, Conn., reports that beets are grown for seed each year in the Milford, Conn., area. During the period of oviposition by the first generation of the European corn borer, seed-beet plants are in a growth stage favorable to infestation. For the past few years the borer has so severely damaged the beets that a great many branches and main stems break over, allowing the seed to dry up before maturing. This causes poor germination, with consequent losses to growers. As this is an important crop economically, and as the plants are susceptible to insecticidal treatment, experiments were included in the 1936 field-plot program with the object of determining what protection might be afforded by spray treatments. Phenothiazine was used at the rate of 4 pounds per 100 gallons of water, and tank-mixed nicotine bentonite was used at the rate of

4 pounds processed bentonite and 1 pint of nicotine sulphate per 100 gallons of water. Butyl phenyl-phenol sodium sulphonate (1-2,500) was employed as a wetting and spreading agent in both sprays. The materials were applied with two 15-gallon wheelbarrow sprayers. These were equipped with a 5-gallon auxiliary air chamber, permitting a continuous spray pressure of 100 pounds during all applications. The results obtained in this experiment were as follows: (1) The preparation of nicotine bentonite was superior to phenothiazine as a means of protecting the beet plants from infestation and from breakage occurring at any point in the plant. (2) Phenothiazine showed a reduction in the amount of plant breakage due to treatment of 44.8 percent, as compared with 66.4 percent in plants treated with nicotine bentonite. (3) The number of points of breakage per 100 plants was greatly reduced in plants treated with nicotine bentonite and particularly the number of main stems and side branches received superior protection in these plots, as compared with those in untreated plots.

Limits of dispersion of corn borer parasites in Massachusetts.--C. A. Clark and Emory Burgess, Moorestown, N. J., report as follows on the results of a summer survey to determine the limits of dispersion of Lydella grisescens R. D. and Inareolata punctoria Roman., two imported parasites of the European corn borer, in the vicinity of Malden, Mass. Both species have dispersed uniformly to a distance of approximately 20 miles from the point of original release. This indicates an average rate of spread for both of approximately 1-1/4 miles per year.

JAPANESE BEETLE CONTROL

Conditions of gypsy moth infestation.--As reported by the district inspector at Keene, N. H., the gypsy moth infestation has decreased considerably, although egg clusters are still noticeable on the shade trees and in the woodland. While scouting a greenhouse at Dedham, Mass., a district inspector was shown a nearby infestation which, he states, is the worst he has seen in his district for many years. Every tree on a single property was practically covered with egg masses. Many of the trees in the heavily defoliated sections are now refoliating, so that moth feeding is not now so apparent.

Moth pupae removed from Illinois-bound chairs.--While driving through Rockland, Maine, on August 17, the district inspector noticed shipping tags on two iron antique chairs in the yard of an antique shop. Upon inquiry it was learned that the chairs had been purchased by an individual in Moline, Ill., and were to be shipped that day. Examination of the chairs disclosed eight living gypsy moth pupae, mostly females. Further examination of the articles in the yard revealed gypsy moth egg clusters on an old cannon, a one-horse shay, and statuary.

Satin moths more numerous.--Although no actual scouting has been performed to determine the increase or spread of satin moth infestation, district inspectors report that egg clusters of this species are more numerous than a year ago throughout the area regulated for this insect. Egg clusters are much more noticeable in Cheshire and Sullivan Counties, N. H., and in Bellows Falls, Westminster, and Brattleboro, Vt.

Newly discovered Dutch elm disease infections.--Confirmations were received during the period from Little Silver, Fairhaven, and Holmdel, in Monmouth County, N. J. Finding of these three trees increased the infected zone by 112.68 square miles. Another confirmation of a tree in Hopewell Township in Mercer County, N. J., further extended the infected area by 57.03 square miles. This makes a total of 2,698.64 square miles in the New Jersey infected zone. It was also necessary to add 63.61 square miles to the protective zone in Bucks County, Pa., making a grand total of the protective band in Pennsylvania of 153.26 square miles. A New York confirmation of a tree outside the known infected zone was also received from the town of Huntington, Suffolk County, Long Island. The Suffolk County tree extends the line circumscribing the outermost infections approximately 5½ miles eastward on Long Island. The latter tree is about 6 miles from the nearest previously discovered confirmed tree. A second tree has been confirmed in the town of Minesink in Orange County, N. Y., close to the New Jersey-New York State line and near Port Jervis.

W. P. A. personnel increased.--In an attempt to speed up the elm sanitation work by the quick removal of all standing dead and dying elm trees already tagged for destruction, requests were placed on August 20 with the Works Progress Administration in New Jersey for 2,600 additional workers. The requests call for 2,000 unskilled and 600 skilled laborers, the latter to be furnished under the 30-percent nonrelief exemption allowed. There are now 370,553 dead or more-than-half-dead elms awaiting removal, over 70 percent of which are in New Jersey. Further accretions to this total will be had as the dead and dying tree tagging progresses in conjunction with the systematic scouting now being carried on.

Dead tree tagging started.--Tagging of dead and more-than-half-dead elms to be removed in connection with the elm sanitation campaign has been in progress for several weeks. This is combined with the second or third surveys for diseased trees. Most of the dead-tree scouting in New York has thus far been accomplished on Long Island, Staten Island, and in lower Westchester County. The combined third go-over and dead-tree survey has been started generally over both the infected and protective zones in Fairfield County, Conn. In New Jersey both dead-tree scouting and an elm census are being combined with the second survey for diseased trees.

Scouting of right of ways.--Railroad scouting is well under way. The work is confined principally to towns, switches, and transfer points. The railroads now being worked are the New York Central, Erie, and Lackawanna, from New York City; the Pennsylvania, from Philadelphia; the Baltimore and Ohio and the Western Maryland, from Baltimore; the Norfolk and Western from Norfolk; the Southern, the Illinois Central, the Louisville and Nashville, and the Missouri Pacific, from New Orleans to the Midwest; and the Big Four and other connecting roads in Ohio and Indiana.

Fewer beetles in Philadelphia area.--There has been a decided decrease in the number of Japanese beetles in Philadelphia this year. The waterfront district is practically free from flying beetles, and they have practically disappeared from the parks and public squares nearest the markets.

This same condition has been noted along the water front in Camden, from which in former years the beetle has flown in large numbers to the Dock and Callowhill markets on the Philadelphia side of the river. Despite the decreased beetle population in Philadelphia, 323 beetles were found on produce and cut flowers inspected there from July 15 to July 31. Of this total, 138 were removed from cut flowers and 185 from produce. Produce was inspected at the Philadelphia platform for 249 ships leaving that port.

Short season for blueberries.--Early in August harvesting of cultivated blueberries ceased in the New Jersey pine barren region and the fumigation house at New Lisbon was closed for the season. Usually fumigation of blueberries continues until the end of August, but this year the extreme heat and lack of moisture during July shortened the crop. Many of the express agents contacted in connection with the certification of huckleberries from the Pennsylvania mining regions state that this has been one of the worst years for huckleberries that they have experienced. Some sections report a 15-percent decrease in shipments. They attribute this to a severe winter and a dry summer. An exception was noted at Mount Carmel, where the agent stated that they had already shipped 700 more crates than last year.

Japanese beetle trapping nears completion.--Trapping has been concluded for the season in South Carolina, Tennessee, and Virginia. All traps in North Carolina have been lifted, except those in Winston-Salem, where 37 beetles have been caught. With a few exceptions, all traps placed in the nonregulated section of Maryland have been removed. Traps are still in operation in Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Michigan, Missouri, New Hampshire, New York, Ohio, Pennsylvania, Vermont, and West Virginia.

Beetle spreads in Hartford district.--There has been a general spread of the Japanese beetle in the Hartford, Conn., district this season. Beetles have been found during the current scouting season at every classified establishment in Hartford, and East and West Hartford. Because of this, several classified firms have dropped their classification. Four Japanese beetles were found on greenhouse premises at Springfield, Mass., and six were caught in traps operated some distance from this greenhouse by the Springfield Park Department.

N. Y. A. girls act as trap tenders in Erie.--Of 20 youths assigned by the National Youth Administration to Japanese beetle trapping in Erie, Pa., 14 are girls. These employees work two 5-hour days per week, and are paid at the rate of 50¢ per hour. According to the trap supervisor, the girls display slightly more enthusiasm in this work than do the boys.

Concord, N. H., undertakes Japanese beetle control.--City officials at Concord, N. H., have sprayed the foliage of trees and shrubs in the vicinity of the Japanese beetle infestation in that city.

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FOREST INSECT INVESTIGATIONS

Grasshoppers defoliate ponderosa pine.--Owing to the shortage of preferred host materials, many thousands of ponderosa pine trees on the Custer National Forest in eastern Montana were defoliated by grasshoppers in August. This forest, which has suffered from drought for the past few years, was swept by devastating epidemics of grasshoppers and Mormon crickets during the past season. After all green vegetation on the forest floor had been devoured, the grasshoppers were apparently forced to feed on pine foliage. J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, states that this attack occurred around the edges of grass areas devoid of all green vegetation and often extended back into the forest several hundred feet. In many localities the attack was so severe that large areas of trees from 25 to 30 feet high were completely defoliated. So scarce was feed material for these invading hordes of grasshoppers that standardized wood cylinders used to record the moisture content of fuel materials in relation to forest-fire danger were fed upon so heavily that their value was seriously impaired.

Mountain pine beetle survey nears completion.--Mr. Evenden also reports that the 1936 survey of the mountain pine beetle infestation within the white pine stands of the Coeur d'Alene National Forest, which started on August 10, will be completed during the latter part of September. This survey has been conducted annually for the past 6 years in order to determine the effects of the control measures conducted against this infestation during the years 1930 to 1934, inclusive. About $290,000 was spent in this operation, which was the largest bark-beetle control project ever undertaken. No control measures were conducted during the season 1935, as it was believed that the infestation had been restored to normal and, though this season's survey has not been complete, the data obtained indicate a still further reduction in the severity of the infestation. In comparing the present condition of the Coeur d'Alene National Forest with other areas where no control measures were undertaken it is very evident that as a result of this operation the valuable white pine stands of this forest have been preserved, for had the epidemic been allowed to develop to its maximum severity a large percentage of the commercial timber would have been destroyed.

A method for detecting liberated beetles.--A. E. Lantz, of the Morristown, N. J., laboratory, has suggested a method to be used in connection with flight studies that R. R. Whitten of the same laboratory is carrying on with the smaller European elm bark beetle (Scolytus multistriatus Marsh.) and the native elm bark beetle (Hylurgopinus rufipes Eich.). In these studies thousands of beetles are liberated at a central point. Elm logs are put out at measured distances from this point to attract the beetles. As other beetles of both species are present in the area, it was necessary to determine whether or not the beetles attracted to the logs were those that had been liberated. The procedure suggested by Mr. Lantz has given dependable results. Before the beetles are liberated they are submerged in a saturated solution of sodium hyposulphite, from which they are later removed and drained. Beetles attracted to the logs are collected individually in gelatine capsules. As soon as possible after they have been collected, each beetle is placed in a small glass vial containing about 2 cc of distilled water and a drop of potassium permanganate-sodium hydroxide indicator. When beetles that have been submerged in the solution of sodium hyposulphite before liberation are placed in the vials the liquid in the vials changes from purple to yellow. C. L. Griswold, of the Morristown, N. J., laboratory, submits data indicating how many adults of the native elm bark beetle may issue from a square foot of bark surface. Infested material, consisting of approximately 130 square feet of bark, was collected in Westfield, Mass., on July 14. Between July 17 and August 31 approximately 51,884 beetles issued, an average of 399 beetles per square foot.

Parasites of European spruce sawfly liberated.--P. B. Dowden and P. A. Berry, New Haven, report liberation of the following parasites of *Diprion polytomum* Htg. These parasites were received from the Dominion Parasite Laboratory, Belleville, Ontario, and are European species. The host species in all instances was *D. polytomum*.

Place	Parasite	
	Species	Number
Connecticut:		
Orange----------------	*Microplectron fuscipennis*	30,000
Maine:		
Bar Harbor------------	do.	30,000
Masardis--------------	do.	20,000
Presque Isle----------	do.	30,000
Massachusetts:		
Petersham-------------	do.	20,000
New York:		
Raquette Lake---------	do.	20,000
Tupper Lake-----------	do.	30,000
Vermont:		
Mendon----------------	do.	20,000
Connecticut:		
Orange----------------	*Exenterus abruptorius*	1,351
New York:		
Tupper Lake-----------	do.	1,460

The *M. fuscipennis* were sent from Canada as pupae still within their host cocoons. The host cocoons were put up in small frames which allowed the adult parasites to issue normally. Issuance started almost immediately after the frames were placed outside. The *E. abruptorius* were sent as adults.

Other parasite liberations.--Messrs. Dowden and Berry also report the liberation of two species of larch case bearer parasites in Maine and several species of European pine shoot moth parasites in New York and Connecticut. A colony of 500 mated females of *Ephialtes examinator* was sent to the Dominion Parasite Laboratory at Belleville, Ontario. These parasites were liberated by the Canadian officials at Toronto, Ontario.

European spruce sawfly not gaining in Maine.--H. J. MacAloney, New Haven, reports that there does not appear to be any noticeable increase in European spruce sawfly infestation in northern Maine. Cocoon counts showed less than one sound cocoon per square foot, but over an area of several hundred square miles there is obviously a population present that, under favorable conditions, could develop into epidemic proportions. This area will be studied intensively in 1937 and sample plots will be established to determine the fluctuation in population and the extent of damage.

Sawfly discovered in isolated pine plantations in Nebraska.--The first evidence of a defoliator in the pine plantations which comprise the Nebraska National Forest was the discovery of a small infestation of a sawfly on August 13 by L. G. Baumhofer, of the Fort Collins, Colo., laboratory. These plantations are some 50 or 60 miles from the nearest native pine timber, and the method and source of introduction for the sawfly is a mystery. The infestation is located at the east edge of the plantings, adjacent to open sandhills and a mile from the main road and the nursery. The outbreak covers 1-1/2 acres of ponderosa pine, with part of the trees heavily defoliated, except for the current needles. The sawfly, probably a species of Neodiprion, was in the larval stage in cocoons in the soil in mid-August. Empty cocoons indicated that the insect had been present for at least two seasons. The destruction of the old needles by the sawfly, combined with the prevalent damage to new growth shoots by the pine tip moths, probably cause serious losses to pine in the plantations and an attempt is being made to eradicate the sawfly.

Spruce bark beetle takes its toll.--H. J. MacAloney and J. V. Schaffner, Jr., New Haven, report that a reconnaissance of the Falls Brook Drainage of the Green Mountain National Forest revealed the fact that over 90 percent of the merchantable spruce over an area of about 500 acres has been killed by the eastern spruce bark beetle. The infestation is spreading to the adjoining Battell Memorial Park, where control measures must be instituted if the large spruce is to be saved.

Insecticides tested in control experiments.--S. F. Potts, New Haven, reports on experiments conducted for the control of the European pine shoot moth with insecticides. The following insecticides were tried: Lead arsenate 3-100 and 6-100, with linseed oil; derris 4-100 and 8-100, with 1 percent linseed oil; lime sulphur 1-20; bordeaux mixture 4-4-50; nicotine tannate 1-400, with 1 percent linseed oil; phenothiazine 6-100. Some measure of control was obtained from the heaviest dosage of lead arsenate, but the derris coated with linseed oil was the most effective insecticide, giving approximately 75-percent control. Mr. Potts reports that preliminary tests indicate that larvae of the European spruce sawfly are very susceptible to lead arsenate, calcium arsenate, derris residue, derris, and lime sulphur concentrate. The following concentrations of these insecticides were very effective: Lead arsenate, 2 pounds to 100 gallons containing 0.17 linseed oil; calcium arsenate, 2 pounds to 100 (containing a 0.5-0.5-50 bordeaux mixture); derris residue, 0.5 to 100 (containing 0.5 percent linseed oil); derris (4 percent rotenone), 2 to 100 (containing 0.5 percent linseed oil); lime sulphur concentrate, 1 to 33. Larvae of this sawfly were very resistant to nicotine sulphate, nicotine tannate, phenothiazine, and pyrethrum.

The Black Hills beetle establishes an emergence record.--During the period August 7 to 14, 1936, a record emergence was established by the Black Hills beetle (Dendroctonus ponderosae Hopk.), according to J. M. Whiteside, Fort Collins. At an elevation of 10,000 feet on Elk Mountain, Wyo., 287 adult beetles emerged from 2 square feet of bark of limber pine (Pinus flexilis) in 1 week. The infested trees were attacked during August 1935. The heaviest emergence over a similar period from identical cages in that year was 232 adult beetles collected at an elevation of 8,000 feet during the period August 7 to 14. Records during 1935 showed that at 10,000 feet heaviest emergence was 156 adults from 2 square feet of bark, but this occurred nearly a month later than the present record. These records indicate a much heavier and much earlier emergence in 1936 than in 1935.

Beech scale increased.--R. C. Brown, of the New Haven, Conn., laboratory, reports that during the latter half of August examination was made of the permanent sample plots established in 1933 in Maine for a study of the beech scale in connection with the Nectria problem. These plots are distributed over a considerable portion of the central and eastern parts of the State. Over this entire region there has been an appreciable increase in intensity of scale infestation and in some plots a tremendous increase was noted. An increase in Nectria infection was also observed. The beech scale predator, Chilocorus bivulnerus Muls., was present throughout the area, but has apparently been unable to check appreciably the increase of its host. In the Boston, Mass., district a marked increase in degree of scale infestation was observed in a number of localities. The death of one large beech this season in the town of Beverly, Mass., is of particular interest. This tree was heavily infested with the scale in 1935 and again in 1936 and has apparently died from insect attack. Only one small area of bark, covering some 25 square inches, is, at present, visibly infected with the fungus, Nectria. Sample plots have been established on Long Island, N. Y., Westchester County, N. Y., and Hartford, Conn.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Emergency workers in moth control.--Gypsy moth work since the close of the spraying season early in July has been carried on with a reduced force of W. P. A. workers. On August 31 there were 2,869 W. P. A. workers employed in the New England States (except Rhode Island), New York, New Jersey, and Pennsylvania on the gypsy moth project. On the same date 259 W. P. A. workers were engaged in brown-tail moth work in Maine, New Hampshire, Vermont, and Massachusetts. During August there were 1,430 C. C. C. men engaged on gypsy moth work in Vermont, New Hampshire, Massachusetts, and Connecticut, in the area adjacent to and east of the barrier zone along the Connecticut River.

Report on spraying work.--Most of the spraying for control of the gypsy moth is done in difficult terrain. In Tobyhanna township, Pa., the spraying crew performed an interesting piece of engineering. The area to be sprayed was situated across the Lehigh River from the only road on which the spray-pump truck could travel to within striking distance of the job to be done. An iron cable 400 feet long was thrown across the river at the nearest point approaching the area to be covered, fastened at each end, and supported by piers constructed of stones from the river bed and logs cut on the spot. A convenient foot passage was made by placing planks between the piers; then the spray hose was attached to the cable and placed across the river from the pump truck to the field of operations. During the spray operations against the gypsy moth a total of 68 sprayers were used, as follows: 32 in Pennsylvania, all working on double-shift; 17 in Connecticut, 4 working double-shift; 10 in Massachusetts, 4 on double-shift; 1 in New Hampshire, double-shift; 5 in Vermont, all starting on double-shift but the working of the men on Saturday was disapproved by the W. P. A. director for that State, hence, the double-shift system was discontinued. Weather was favorable during most of the spraying season and it was necessary to obtain more lead arsenate. One emergency lot of 50 tons and another of 20 tons were procured during the spraying season. In some of the areas being sprayed the source of the water gave out, making it necessary to move to a new place for water or lay out more hose; in some instances several thousand feet were necessary. In one locality in Vermont 7,000 feet were required, with the pump working under a pressure of 1,500 pounds. The 12 new-type sprayers purchased this season have been thoroughly tried out and have given satisfactory service. Several of these machines were worked on a double-shift schedule and operated continuously 10 hours each day. Practically no mechanical difficulty was encountered and they appeared in good condition at the end of the season. These sprayers are equipped with a self-contained power unit capable of running the pump at a pressure of 1,500 pounds. These units are set on a 1-1/2 ton chassis and are driven to set-ups where it would be much more difficult to reach with the heavier type machines used in this activity for a number of years. At the end of the season these units are removed and the trucks are used for hauling supplies. In many of the areas where spraying was done it was necessary to erect barbed-wire fences around the treated area or on some sides of it to keep cattle from entering. When the spraying was completed it was necessary to have men patrol the fences, as these sometimes get broken by falling limbs or other causes--some were deliberately cut by unknown persons. At Tobyhanna, Pa., a deer ran into one of the fences and broke it down. The deer's neck was also broken. In areas where fish oil was used as an adhesive these fences are patrolled until fall. In treated areas, where fish oil is not used as an adhesive, the patrolling is continued until after one or two heavy rains which reduce the spray deposit on the undergrowth to a minimum; then it is discontinued.

Bait trapping for gypsy moth.--Assembling-cage work has been under way for the usual purpose of checking new infestations and reinfestations in sections where regular scouting could not be carried on. These cages are baited with an attractant and placed in the field to lure and trap the male gypsy moth. The attractant used in the cages is obtained from female gypsy moths, and a collection of 672,702 female pupae was made, largely in

Franklin County, Mass., from which moths were reared for that purpose. While the collection was made primarily for attractant material, it should help in reducing infestation in the collection area next year.

PLANT DISEASE CONTROL

Barberry-eradication work in Ohio.--The use of emergency funds to employ laborers on the barberry eradication program in Ohio since August 1935 has made possible the destruction of more than 260,000 barberry bushes on 1,711 properties. During this period approximately 95 percent of all the men employed were taken from relief rolls and 377,416 man-hours of labor were used. Of the total amount of money expended, 94 percent went to labor. The cost per man-year, based on total expenditures, was $776.46. The enlarged program made possible by the use of emergency funds afforded an opportunity to make a systematic coverage of 7,235 square miles of territory in 30 counties. The area covered consisted of waste land, wooded land, river banks, and cultivated rural as well as urban sections. In the territory surveyed barberries had escaped cultivation on 817 properties. The enlarged program made it possible to bring these extensive areas of infestation under control.

Barberry eradication prevents damage to grain crops in Pennsylvania.--During the past year, since barberry eradication was begun in Pennsylvania with funds allotted by the Works Progress Administration, 1,200 square miles of territory in eight counties have been intensively surveyed for rust-susceptible barberries. Within this area 1,301,513 barberry bushes have been destroyed on 1,751 properties. Numerous areas of escaped bushes in the territory have been surveyed where farmers in the immediate vicinity of the bushes had reported repeated failures of small-grain crops because of stem rust epidemics caused by the proximity of barberry bushes. In a few of these areas the bushes were eradicated before they became infected in the spring. As a result of the eradication work, the grain fields in the vicinity of the completed areas were not damaged by stem rust during the past summer, whereas grain fields near barberry bushes throughout the State were, in general, heavily rusted. There was no noticeable stem rust damage this year in northern Lackawanna County, where many farmers in past years have been forced to abandom growing oats because of stem rust losses.

Another blister rust infection center found in California.--Scouting in northern California resulted in the location of 120 Ribes bushes and 2 sugar pines infected with blister rust. Infections were found on R. bracteosum, R. sanguineum, and R. lobbii. This infection spot was about 5 miles south of the Oregon border along the East Fork of Indian Creek and is the first infection found south of the summit of the Siskiyou Mountains in California. It is located in sugar-pine type, and numerous Ribes of several species occur all through this area. The discovery of this infection is of particular significance in that it discloses the rust to be established south of the Siskiyou in a region where sugar pines and Ribes are numerous and conditions for the general spread of infection over the northern Sierras into commercial pine areas are most favorable.

Midwest drought reduced infection on Ribes.--The prolonged Midwest drought had very noticeable pathological and physiological effects upon Ribes in the North Central States. The intense heat, together with the lack of precipitation for 3 months, greatly reduced the usual intense infection on Ribes. It is also reported that telia were late in forming and appeared very sparsely. A large number of the upland Ribes species were completely defoliated; however, some of these defoliated bushes are producing new leaves since the recent rains.

New blister rust demonstration area.--District leader H. G. Bradbury, in charge of blister rust-control activities in Waldo and Knox Counties, Maine, recently established a roadside demonstration near the town of Belfast. The area comprises about 2 acres of uneven-aged pine, ranging from seedlings up to trees 12 inches in diameter. About 65 percent of the pines are infected with blister rust and each diseased tree has been marked with yellow paint. Dead and dying trees of all sizes are conspicuous. Suitable signs, calling attention to the damage caused by the disease and the need for control, are so situated that people stop and inspect the area. The average attendance has exceeded 50 per day since the demonstration was established August 22, and 138 persons visited it on Sunday, August 30. An attendant has been on hand to guide visitors through the area and to explain to them the nature of the disease and its control.

Blister rust workers in Colorado camp experiment in planting grass seed on soil disturbed through Ribes eradication.--An interesting and what may prove to be a valuable experiment was started this summer in a blister rust-control camp in Colorado. An old-time rancher who lives in the vicinity of the camp conceived the idea that a few pinches of grass seed dropped by the Ribes eradicators on the soil disturbed through the eradication of each Ribes bush would aid in renewing the reduced range cover on certain areas being worked. This experiment seemed practical, as it would require very little of the eradicator's time and would not involve the transportation of a weighty or bulky load; therefore, after a discussion with several interested parties some seed, consisting of bromegrass, wheatgrass, and sweetclover, was obtained from the Soil Conservation Service and sowed in July. Some grass had started from the plantings by the latter part of the month but dry weather prevented good germination. The heavy rains that have fallen since are expected to aid germination and provide enough moisture for good growth.

COTTON INSECT INVESTIGATIONS

Toxicity of insecticides against cotton flea hopper.--K. P. Ewing, Port Lavaca, Tex., summarizes the cage toxicity tests conducted during the summer of 1936 with 20 dusting materials against Psallus seriatus Reut., as follows:

Insecticide	Mortality of--		
	Adults	Nymphs	Average
	Percent	Percent	Percent
40% pyrethrum-60% sulphur----------------	71.0	93.5	82.3
10% paris green (air-floating)-90% sulphur	82.0	71.8	76.9
20% pyrethrum-80% sulphur----------------	47.6	81.5	64.6
10% paris green (regular)-90% sulphur----	56.0	72.4	64.2
7½% paris green-92½% sulphur-------------	49.3	68.3	58.8
5% paris green-95% sulphur---------------	47.9	68.4	58.2
20% pyrethrum-10% paris green-70% sulphur	28.3	74.4	51.4
10% pyrethrum-90% sulphur----------------	18.1	79.9	49.0
Sulphur (325-mesh 97% sulphur)-----------	15.2	76.0	45.6
10% pyrethrum-10% paris green-80% sulphur	25.5	62.7	44.1
20% pyrethrum-5% paris green-75% sulphur-	19.6	66.5	43.1
10% pyrethrum-5% paris green-85% sulphur-	29.9	52.2	41.1
20% calcium arsenate-80% sulphur---------	25.2	56.9	41.1
10% pyrethrum-10% cube-80% sulphur-------	15.0	67.0	41.0
23.5% devil's-shoestrings-76.5% sulphur--	11.8	63.8	37.8
33 1/3% calcium arsenate-66 2/3% sulphur-	24.1	49.2	36.7
50% calcium arsenate-50% sulphur---------	23.0	48.3	35.7
47% devil's-shoestrings-53% sulphur------	9.2	42.2	25.7
Calcium arsenate-------------------------	30.6	10.2	20.4
94% devil's-shoestrings-6% sulphur-------	8.4	26.7	17.6
Untreated checks--average mortality among 865 adults in 18 cages and 998 nymphs in 21 cages----------	6.0	11.0	8.5

In the treated cages 5,628 adults and 3,628 nymphs were used, or an average of 281.4 adults and 181.4 nymphs for each material tested. The pyrethrum used contained 0.9 percent total pyrethrins and the devil's-shoestrings (Cracca virginiana), furnished by the Bureau of Plant Industry and analyzed by the Division of Insecticides, contained 1.72 percent rotenone and 7.5 percent total extractives $(C\ Cl)_4$. Eighteen of the materials tested caused higher mortality among nymphs than adults. Only two, the mixture of 10 percent air-floating paris green and 90 percent sulphur, and calcium arsenate, caused higher mortality among the adults. For use against the cotton flea hopper these tests indicate that little can be expected from the rotenone-containing materials, devil's shoestrings, cube, and calcium arsenate, but that effective control can be obtained from sulphur, and sulphur-paris green and sulphur-pyrethrum mixtures.

Notes on egg parasites of the cotton flea hopper.--Mr. Ewing and H. J. Crawford report concerning the recently discovered egg parasites of the cotton flea hopper as follows: "The emergence from collections made in different places in a field of croton at Olivia, in Calhoun County, indicated that the percentage of parasitization of cotton flea hopper eggs was higher where the croton plants were growing among senna weeds. It is possible that the partial protection from the sunshine, wind, or rain was beneficial to the parasites; however, the percentage of parasitization has not been found high in collections made in woods. The comparisons indicate that the percentage of parasitization of flea hopper eggs was higher in the first half of July than during the latter part of the month. From a collection made July 6, 41 flea hoppers and 68 parasites emerged. A collection was made in the same field July 30 and 42 flea hoppers and 40 parasites emerged. The percentage of parasitization of the first collection was 62.4, whereas that of the latter was 48.8. In another field the percentage of parasitization in a collection made on July 13 was 88.5, and in a collection of July 24 it was 62.8."

Control of the cotton leaf worm by insecticides.--Mr. Ewing also reports that opportunity to note the degree of field control of the cotton leaf worm from the different materials used in boll weevil control experiments at Edna, Tex., presented itself when there was a sudden and extra heavy infestation of leaf worms in all experiments during the latter part of July. The materials that were being tested for boll weevil control by dusting at 5-day intervals were: 50 percent calcium arsenate and 50 percent sulphur; 33-1/3 percent calcium arsenate and 66-2/3 percent sulphur; 20 percent calcium arsenate and 80 percent sulphur; 10 percent regular paris green and 90 percent sulphur; 10 percent special paris green and 90 percent sulphur. All of these materials gave perfect control, except the mixture of 20 percent calcium arsenate and 80 percent sulphur. In order to control the leaf worm, one plot dusted with this mixture had to have an application repeated within 3 days, instead of waiting for the 5-day routine dusting schedule. The 10 percent paris green-sulphur mixtures gave quicker results than any of the other materials in checking the leaf worms and the 33-1/3 percent calcium arsenate-sulphur mixture gave the slowest results of any of the effective materials.

Internal boll diseases of cotton distributed by insects.--T. P. Cassidy and L. D. Christenson, of Buckeye, Ariz., in a preliminary report on the causes and abundance of internal boll diseases of cotton, such as stains, spotting, and rotted seeds, have found that disease occurs only after the boll wall has been punctured, allowing some pathogen to gain access. In the Salt River Valley the instruments of infection are mainly the boll-puncturing insects. In eight fields on which records were made an average of 39.4 percent of the green bolls were insect-punctured and more than 90 percent of the punctured bolls were stained. A number of fungi and one bacterial organism have been isolated from internal-boll-disease cases which followed feeding by common pentatomids. Of these, the bacterial form shows a definite tendency to produce yellow or brown discolorations, even staining nutrient agar to approximately the same color as typical lint stains. Under experimental conditions, this organism (which has been designated for the time being as Bacteria A), upon inoculation into clean unpunctured bolls by means of a hypodermic needle, produced lint stains and internal rot identical in appearance with conditions so commonly encountered in cotton fields. Inside of bolls inoculated in the same manner with sterile water, no lint stains or other rot conditions develop when wounds formed by the needle are protected from infection by an aseptic dressing or a hot paraffin plug. This fact plus the fact that the bacterial suspension produced internal disease has been demonstrated in experiments so frequently that it may be considered almost conclusive.

The bolls inoculated with the bacterial suspension were dressed or paraffined in like manner to prevent external contamination. Inoculations made on immature lint dissected from clean unpunctured bolls, placed in test tubes plugged with cotton and sterilized, developed stains in 72 hours from the time of inoculation. The checks remained white and unchanged, even though exposed to the air, and indicate that oxidation processes are not directly responsible for lint stains. Bolls pricked through the exocarp with a sterile needle in the field developed severe lint stains in a goodly percentage of cases. In this experiment the bolls were sacked after being pricked, to prevent insects from attacking them. The wounds from the needle, however, were not sterilized and were left exposed with no protection from subsequent infection. The fact that most of these bolls developed stains readily within a week's time indicates that staining organisms are of rather general distribution and are not necessarily dependent on insects for their distribution. These studies are being continued in cooperation with the plant pathologist of the Bureau of Plant Industry stationed at Sacaton for checking their pathological accuracy.

Long-cycle larvae of pink bollworm in Puerto Rico.--L. C. Fife, Mayaguez, reports on experiments conducted to determine the percentage and duration of long-cycle pink bollworm larvae in open bolls and the duration of long-cycle larvae in soil cocoons. Of 910 cocoons in tests on the northern coast and 960 cocoons on the southern coast during June and July, none were recovered when examinations were made 30 and 36 days after they were installed. Very few long-cycle larvae occurred in open bolls on the northern coast during this period, as less than 1 percent of the larvae installed in the middle of June were present a month later. On the southern coast, however, of 471 fourth-instar larvae in bolls installed on June 23, 24. or 5.1 percent, remained inactive and had not pupated after 31 days, and 11, or 2.3 percent, after 62 days. At Boqueron, on the southern coast, an experiment was started on August 1 by installing 374 fourth-instar larvae in cages under shelter to protect them from the sun and rain, and the same number in cages in the open. Thirty days later 94, or 25.1 percent, of the larvae under shelter were inactive, while only 7, or 1.9 percent, of those placed in the open had not pupated. These results indicate that rainfall and temperature are important factors influencing the number of long-cycle larvae that develop in open bolls. Dry weather seems to increase the duration of this inactive or long-cycle larval stage in the tropics, while the development of resting-stage larvae in the temperate zone has usually been attributed to lower temperatures.

Degree of injury to cotton in Puerto Rico by Dysdercus spp.--Mr. Fife made a survey of cotton fields along the northern coast of Puerto Rico to determine the amount of stainer injury to mature green cotton bolls. Although pentatomids cause some of this stainer injury, during the present season most of it was caused by Dysdercus neglectus Uhl., with some caused by D. andreae L. Of 24 fields examined, the boll injury per field averaged 25.7 percent, ranging from 1 percent at Hatillo to 76 percent at Quebradillas.

Parasites of pink bollworm in Puerto Rico.--Mr. Fife reports that the parasites Chelonus blackburni Cameron and Exeristes roborator Fab., recently introduced through the cooperation of the Division of Foreign Parasite Introduction, have been recovered at Isabela, P. R. Specimens of both species were obtained from open cotton bolls heavily infested with pink bollworms and C. blackburni was also recovered from heavily infested mature green bolls, but each of these species has so far parasitized less than 2 percent of the bollworms. Studies will be continued to determine whether the parasites become more effective. A native parasite, Perisierola of a new species near P. nigrifemur (Ashm.) (det. C. F. W. Muesebeck), is also present but on less than 1 percent of the pink bollworms. It is an external parasite and several individuals will mature on one pink bollworm.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Rio Grande Valley infestation.--The finding of the new pink bollworm infestation in the lower Rio Grande Valley was discussed in the last number of the News Letter (vol. III, no. 8). Gin-trash inspections in this area were completed on August 22. On the Mexican side of the river additional specimens were found, a total of over 300 being taken at Matamoros and at Reynosa, about 60 miles up the river from Matamoros. On the Texas side additional specimens were found at Brownsville and San Benito. A total of 4 specimens was found at Brownsville and 19 at San Benito, both of these towns being in Cameron County. At Rio Grande City, in Starr County, 1 specimen was found. This makes 24 specimens found on the Texas side. Quarantine No. 52 was amended effective August 17 so as to add the counties of Cameron, Hidalgo, Starr, and Willacy to the lightly infested areas. It was necessary to include the two counties in which no specimens were found because seed cotton moves through them for ginning, without regard to county lines. A sufficient number of inspectors has been placed in the area to enforce the regulations. Inasmuch as most of the cotton crop had been ginned when the infestation was found, it was impracticable to install sterilizers; however, all the seed produced after the regulations went into effect was sent to designated oil mills, where they were given a heating or precooking immediately upon arrival. The lint was required to be compressed. The necessary equipment for treating the various products will be installed before the next crop is produced.

Gin-trash inspection.--After completing inspections in the lower Rio Grande Valley, the gin-trash machines were moved to various locations immediately surrounding the new regulated area. After thorough inspections had been made at each point they were moved a little farther northward. By the end of the month a considerable amount of trash had been inspected without finding any indication of the pink bollworm. In the Southeastern States gin-trash inspection was begun on August 17. One mobile and two hand machines are being operated in the regulated area of northern Florida and all trash is being inspected, and four mobile and two hand machines are operating in the nonregulated part of Florida, also in southern Georgia and Alabama. Conditions are more favorable for inspections this year than for the past several years. This is due to the fact that there has been very little rain and the gin trash contains very little sand and dirt.

Consequently, a bushel of trash represents quite a few bales, whereas last year a bushel of trash represented only one or two bales. A considerable amount of trash has been inspected with negative results.

Wild-cotton eradication.--The eradication of wild cotton in southern Florida has been resumed on a small scale. There are four W. P. A. crews operating along the west coast and one on Key Largo. Small crews are being used and each is in charge of a W. P. A. man with considerable previous experience. Reports indicate that wild-cotton seedlings have been growing very rapidly and range in size from quite small to plants 4 or 5 feet high, the larger ones being full of squares. It is to prevent these larger seedlings from producing fruit before work can be resumed on a large scale later in the fall that the small crews are being used at this time. From the work so far done, it is evident that these plants would undoubtedly have produced mature fruit before that time.

Thurberia-plant eradication.--Very good progress continues to be made in eradicating Thurberia plants in the Santa Catalina Mountains of southern Arizona. This work is also being done with W. P. A. funds to prevent weevils which infest the plants from spreading to cultivated cotton. There was considerable rain during the month but this occurred mostly in the late afternoons, so that practically no time was lost from work. In a number of instances, however, the auto trails were washed out in places. During August 4,400 acres were covered, from which 154,496 plants were destroyed. This is a much smaller acreage than was covered the previous month; however, there was about a 50-percent increase in the number of plants destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cost of handpicking hornworms on tobacco in Florida.--A recent field survey conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, disclosed that in the north Florida tobacco-producing region, the cost of handpicking tobacco hornworms, principally Protoparce sexta Johan., averaged 89 cents per acre on shade-grown tobacco and 85 cents per acre on sun-grown tobacco. These figures are based on the prevailing cost of labor for adults and children in northern Florida. The estimated control achieved by handpicking methods in vogue averaged 65 percent for the shade-grown tobacco and 62 percent for the sun-grown. While handpicking has been recommended under certain conditions as an aid to the control of the tobacco hornworms in many of the tobacco-producing sections of the United States, no data on the cost involved have heretofore been made available.

Tobacco hornworm feces show presence of nicotine.--An analysis of a sample of feces of Protoparce sexta Johan. collected and submitted by F. S. Chamberlin, Quincy, Fla., revealed the presence of 0.61 percent nicotine, indicating that some, at least, of the nicotine ingested by tobacco hornworm larvae is eliminated from the digestive tract. The analysis was made by workers of the Insecticide Division of this Bureau.

Barium fluosilicate controls margined blister beetle on lima beans.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that a severe infestation of the margined blister beetle on young Fordhook lima beans grown on the Eastern Shore of Virginia was controlled by the application of an undiluted barium fluosilicate dust at the rate of 10 to 12 pounds per acre. At the time this insecticide was applied the plants had not started blooming. Two days after the treatment it was impossible to find any blister beetles in the 2 acres involved in this test. The insects had either crawled away and died or were driven out of the field as a result of the treatment. The same phenomenon was observed 7 days after the treatment was applied. Previous attempts by the grower to control the blister beetles with a calcium arsenate-sulphur-lime dust mixture and with a derris dust mixture containing 0.75 percent rotenone had been unsuccessful.

Number of tomato fruits destroyed by one tomato fruitworm.--In laboratory experiments performed by M. W. Stone, of the Alhambra, Calif., laboratory, it was shown that each larva of the tomato fruitworm (Heliothis obsoleta Fab.) is capable of destroying, on an average, six tomato fruits during its larval period. The number of tomato fruits destroyed by each larva included in the experiment ranged from 4 to 10. From detailed observations, it is believed that where tomato fruits located in close proximity to each other were damaged by tomato fruitworm larvae, in many instances a single larva was responsible for the damage. These studies also demonstrated conclusively that tomato fruitworms are migratory in their habits and commonly travel from fruit to fruit during their period of larval activity.

Trap lights no aid in control of tomato fruitworm in California.--Results of preliminary field experiments to determine the possible efficiency of light traps of the electrocuting type, as an aid to the control of the tomato fruitworm (Heliothis obsoleta Fab.) in California, conducted by J. C. Elmore, Alhambra, Calif., gave no evidence that the use of the trap lights had reduced the infestation in the fields where they were operated. Fields grown under comparable conditions without trap lights were used as a basis of comparison.

Crude naphthalene excels other tested soil fumigants against wireworms in Pacific Northwest.--R. S. Lehman, of the Walla Walla, Wash., laboratory, reports that recent field tests with soil fumigants against the sugar beet wireworm (Limonius californicus Mann.) have demonstrated that crude naphthalene at the rate of 800 pounds to the acre was more effective and cheaper than either calcium cyanide at the rate of 400 pounds to the acre or a commercially prepared soil fumigant consisting principally of crude naphthalene and silica at the rate of 22 parts of the former to 78 of the latter. Whereas crude naphthalene killed approximately 92 percent of the wireworms, calcium cyanide killed approximately 78 percent and the commercially prepared soil fumigant killed 68 percent.

Imported parasites of pea weevil released in Idaho.--T. A. Brindley, of the Moscow, Idaho, laboratory, reports that during 1936 a total of approximately 21,000 living adults of the imported pea weevil parasite

(Triaspis thoracicus Curtis) were received from Europe by way of the Moorestown, N. J., laboratory of this Bureau, and released in pea plantings heavily infested with the pea weevil (Bruchus pisorum L.). The parasite shipments involved a total of approximately 30,000 individuals. Part of these were reared at Moorestown from beans imported from Europe and the parasite adults were shipped to Moscow and an average of approximately 3 percent of the parasites died in transit. The remainder of the parasites were shipped as adults from Europe and in these shipments the parasite mortality in transit averaged approximately 37 percent. Field collections will be made at stated intervals to determine whether these parasites become established in Idaho.

Corn kernels best food for rearing Pacific coast wireworm larvae.--K. E. Gibson, Walla Walla, Wash., reports that laboratory studies in rearing larvae of Limonius canus Lec. have shown that sterilized corn kernels were more suitable for the survival and growth of the wireworm larvae than were sterilized wheat kernels, potato roots, potato tubers, or alfalfa roots. The larvae fed on corn kernels were from two to three times the size of larvae fed on the other foods, after the expiration of approximately 2 months of feeding.

Imported parasites of lima bean pod borer released in California.--Rodney Cecil, of the Ventura, Calif., laboratory, reports that during 1936 a total of 197 adults of the parasite Microbracon piger Wesm. had been released up to the end of August in territory infested by the lima bean pod borer. Also, 52 specimens of the imported parasite Phanerotoma sp. had been liberated. This parasite material was collected in France and forwarded to Ventura, being relayed from the Moorestown, N. J., laboratory.

Increase in weed hosts of beet leafhopper in California.--F. R. Lawson, of the Modesto, Calif., laboratory, reports that in the Los Banos-Mendota, Stanislaus, and Merced sections of California a marked increase has been recorded in 1936 in the acreage of wild host plants of the beet leafhopper. During 1935 a total of 15,227 acres of wild host plants were present, as compared with 21,140 acres in 1936 in the same sections. The principal species of host plants involved were Russian-thistle (Salsola pestifer Nels.), Bractscale (Atriplex bracteosa Wats.), and fogweed (Atriplex argentea expansa Wats.).

INSECTS AFFECTING MAN AND ANIMALS

Bone oil and pine tar oil for control of primary screw worm.--At the Dallas, Tex., laboratory, Roy Melvin and R. C. Bushland have conducted tests of the comparative effectiveness of bone oil and pine tar oil as insecticides for control of Cochliomyia americana Cushing and Patton. A brief summary of the work follows: (1) Two repellent tests conducted with guinea pigs in screened cages showed that bone oil is not as effective a repellent as is pine tar oil (sp. gr. 1.065). Results of tests conducted in July showed little or no difference between the repellent action of the two materials. High temperature as affects volatility and viscosity might explain these differences. (2) The mortality of guinea pigs treated with bone oil was alarmingly high, especially where large and deep wounds were involved. (3) Bone oil is effective against younger larvae but does not give effective control of older larvae. (4) In dipping tests bone oil was about half as toxic to larvae as was pine oil (based on 500 larvae for each material); (5) In ovicidal studies in which eggs were dipped, no marked difference in the toxicity of the two materials was noted (based on several thousand eggs for each material).

Tiny thief ant destroys newly emerged screwworms.--Messrs. Melvin and Bushland also report that at the Dallas laboratory pupae of *C. americana* and *C. macellaria* Fab., in small screen cages, were placed in an improvised post-hole cellar 5 feet deep, to retard development. As soon as the flies emerged, even before their wings expanded, they were attacked and killed by hordes of *Solenopsis molesta* Say.

A successful method of rearing the stable fly.--C. W. Eagleson, of the Dallas laboratory, reports that wild stock of *Stomoxys calcitrans* L. was captured and placed in screen cages 9 cm in diameter and 17 cm long. The cages were set in small pans half filled with water-saturated sand covered with squares of tissue paper. A tissue square was placed on top of each cage and a pad of water-filled cotton placed on it. Besides providing moisture for the flies, the eggs are kept damp, with the result that from 75 to 80 percent of them can be depended on to hatch. The papers are changed daily and the eggs collected and put on larva food medium. The flies are fed twice daily from blood-soaked wads of cotton. A large percentage of the flies fail to find the food pads if the cages are not darkened except for a small area adjacent to the pads. Acidulated blood is kept frozen until feeding time, when a small amount is dug out of the tray and allowed to melt. Blood kept thus for 2 weeks is readily accepted by the flies, even while still ice cold. Females of *S. calcitrans* have been kept for 3 weeks under these conditions and have laid satisfactorily during the entire period. Feeding larger numbers of flies in the large aging cages, a more difficult problem, is not yet solved. Mortality during hot weather is very high if all individuals do not feed at least once a day. In the small cages almost all flies will engorge heavily twice a day. About a dozen different food combinations for the larvae have been tried. To date the most promising is a mixture of crushed oats and fermenting grass hay chopped into 10-cm lengths. Pure oats is not a favorable medium, and growth of the larvae on pure fermented hay seems normal, but exceedingly slow.

FOREIGN PLANT QUARANTINES

Pathological interceptions of interest.--*Ascochyta conorum* P. Henn. was intercepted for the first time on August 10 at New York on spruce cones from Norway in baggage with other coniferous material on the *Queen Mary*. Citrus canker, *Bacterium citri* (Hasse) Jehle, was again intercepted on Japanese oranges on August 8 at New York. *Gloeosporium concentricum* (Grev.) B. and Br. was intercepted at Boston on August 5 on cabbage from England. Our second interception of *Heterodera marioni* (Cornu) Goodey from Chile was made on August 6 at New York in potatoes, and our first interception of this nematode from Poland was made at the same port on August 3 in peony roots. Our first interception of *Leptosphaeria culmicola* (Fr.) Karst. was made on July 19 at New York on wheat stems in baggage. *Mycosphaerella lythracearum* Wolf was intercepted for the first time on July 30 on pomegranate from Mexico at Hidalgo. *Papulospora parasitica* (Eid.) Harz was intercepted for the second time on August 24 on tulips from Holland, at Norfolk. Our first interception of *Pestalozzia guepini* Desm. from Trinidad was made on August 27 on avocado at Baltimore. *Phoma citricarpa* McAlp. was intercepted on lemon from Singapore on August 26 at Boston. The two previous interceptions of black spot on lemon were from Australia and Japan.

Entomological interceptions of interest.--Three pupae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were found at Philadelphia on June 11 in a drawer containing several oranges from Spain. As the pupae cannot be traced directly to these particular oranges, the percentage of infestation cannot be estimated. Five living larvae of the fruit fly *Anastrepha* sp. were intercepted at New York on June 17 in a mango fruit in a box on the deck of a ship. The trash from waste-paper baskets taken out of the cabins on the ship was being dumped into this box on the deck while a thorough inspection of the ship was in progress. Looking through this material 16 mangoes were discovered. The passengers on this trip were from Aruba, Curacao, Venezuela, and Puerto Rico, so there is no way of definitely placing the origin of the fruit. Careful examination of all the mangoes showed an infestation of fruit fly larvae in only one fruit. Two living larvae of the gypsy moth (*Porthetria dispar* L.) were taken at Seattle, Wash., on June 2 on the foliage of a dwarf maple in baggage from Japan. Living specimens of the scale insect *Lepidosaphes lasianthi* Green arrived at Savannah, Ga., on March 11 on a croton plant in ship's quarters from Singapore, Straits Settlements. A living adult of the scolytid *Stephanoderes nitidipennis* Hopk. was taken at New Orleans on May 8 on a pineapple fruit in cargo from Cuba. A living larva of the weevil *Metamasius* sp. was intercepted at Eagle Pass, Tex., on June 4 in a banana in baggage from Mexico. The larva had tunneled into the fruit, entering through a small hole in the peel. Five living larvae of the tineid *Setomorpha insectella* Fab. arrived at Boston on June 8 in yams in baggage from the Lesser Antilles. Seven living larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were taken at San Juan, P. R., on February 12 in 2½ ounces of raw cottonseed in passenger's baggage from the Dominican Republic. A living specimen of the anthribid *Phloeobius pallipes* Jord. was intercepted at San Francisco on June 2 in bamboo in baggage from the Philippines. Living specimens of the gladiolus thrips (*Taeniothrips simplex* Morrison) were taken at the airport at Brownsville, Tex., on March 26 on gladiolus in cargo from Mexico. Living adults of the cucujid *Telephanus costaricensis* Nevermann arrived at Baltimore on June 1 with banana debris in cargo from Guatemala. Living larvae of *Epipolaeus caliginosus* Fab. were intercepted at Washington, D. C., on April 24 in hop roots in express from Kent, England. The larvae of this weevil under the name *Plinthus caliginosus* Fab. are recorded as doing much damage to hops in England by tunneling in the roots.

Cashew fruit as host of Anastrepha.--On June 12, 1936, during an inspection of the Livingston Grove, Dorado, P. R., 38 ripe cashew fruits (Anacardium occidentale) were collected from a sandy waste near the seashore adjoining the grapefruit grove. The soft and fleshy fruit-like receptacles of several of the nuts were cut up in thin slices and 5 larvae, apparently of Anastrepha sp., were found, 2 in one receptacle and 1 in each of three others; while from the remaining fruits 4 pupae were obtained, making a total of 9 larvae and pupae, apparently Anastrepha sp., from the 38 fruits. Two adults reared from the pupae proved to be Anastrepha acidusa. This is the first record of the infestation of cashew by Anastrepha in Puerto Rico. From a subsequent collection of 46 ripe cashew fruits from the same place on July 3, 1936, three pupae were obtained which have given 3 adults, apparently of the same species. Hicacos (Chrysobalanus icaco and C. pellocarpus) found in abundance in the same part of the sandy waste were not infested, but 49 ripe almendras found in another part of the grove on June 12 and 88 more found on July 3 were not infested.

Large number of Medfly larvae intercepted in Hawaiian mango.--A well-matured mango of Hawaiian origin intercepted in a waste-basket in a stateroom during room inspection of the S. S. Lurline arriving at San Francisco on July 31 from the Hawaiian Islands was found on examination to contain an unusually large number of Medfly larvae in all stages of development. An exact count was not made, owing to lack of time, but the number was estimated at well over one hundred. The fruit was broken open under water in the galley of the ship and 62 larvae (counted later) floated out and were placed in alcohol for laboratory examination. The inspector handling the interception stated that he noted an equal number of larvae floating on the surface of the water during the process of destroying the fruit by boiling. A second mango of Hawaiian origin was found on the same vessel in a crew's locker which, in addition to 15 Medfly larvae, contained a larva of the mango seed weevil (Sternochetus mangiferae F.) in the seed. Prohibited fruits, whether infested or not, are destroyed on board by cooking or boiling.

DOMESTIC PLANT QUARANTINES

CHARLES W. LEWIS

Charles W. Lewis, who had been an employee of the United States Department of Agriculture for more than 18 years, died in New York City on August 19. During the past several years Mr. Lewis had been assigned by the Japanese beetle project to transit inspection work in Philadelphia. About two weeks prior to his death, Mr. Lewis had been transferred to carry on similar work in New York City. Funeral services were held on August 23 at Melrose, Mass.

Public hearing on peach mosaic disease quarantine.--Notice that a public hearing would be held on September 14 at Washington, D. C., to consider the advisability of quarantining the States of California, Colorado, New Mexico, Texas, and Utah on account of the peach mosaic disease was issued on August 19. It has since been found desirable to extend the scope of the hearing to include the State of Arizona where the disease was recently found in a preliminary survey, and to hold the hearing on September 21, at Albuquerque, N. Mex. The change has therefore been made for the convenience of those in the infected States who may desire to attend the hearing. Peach mosaic, the newest of the peach virus diseases, is recognized as of serious economic importance. The natural local spread is extremely rapid and may result in infection of an entire orchard in a few years. Recent surveys made cooperatively with the States concerned resulted in finding the disease in eight counties along the Rio Grande drainage area in New Mexico, a second county in Utah, two more counties in Colorado, and nine more in Texas. It was also reported in three counties in California. Last year the disease was known to exist in only 1 county each in Colorado and Utah, and 10 counties in Texas. While no regular appropriation is allotted for Department activities in the control of the disease, an allotment of $25,000 has recently been received from emergency funds for inspection and eradication. The eradication work now under way in California, Colorado, Texas, and Utah will be extended, with the cooperation of State plant pest control officials, to all the infected States.

Phony peach disease found in Indiana and Pennsylvania.--Surveys for the phony peach disease in States north of the region of known infestation have been completed in Ohio, Indiana, and Pennsylvania, with the assistance of State inspectors, and have resulted in the discovery of one infected tree each in Gibson County, Ind., and Berks County, Pa., the latter the most northern point the disease has been found. The survey is to include the peach-growing areas in Virginia, West Virginia, Maryland, Delaware, and New Jersey. Inspections are also under way in 12 southeastern States where the disease is known to exist, the work covering commercial and home orchards, and the environs of nurseries. The work of relief laborers in removing over 42,000,000 worthless peach trees from 212 counties in the infected States during the year is an important supplement to the inspection activities.

Recurrent citrus canker in Galveston, Tex., district.--Several of the properties in Galveston, Brazoria, and Harris Counties, where citrus canker was found last year in an intensive campaign of inspection, and which have been repeatedly inspected in the intervening months, are showing canker on small seedlings. All properties from which citrus plants have been removed under the eradication program are now being reworked for the purpose of removing all seedlings. A close inspection is being made of the entire section in an effort to examine every citrus tree, and all abandoned and escaped trees are being destroyed in the course of inspection. Several other counties in the vicinity are also being inspected, particularly the properties found infected with canker in earlier years, but no further cases of the disease have been found. In the lower Rio Grande Valley, continuous inspection is carried on as a separate and distinct unit. In the past fiscal year the work covered 2,400 grove and nursery properties, principally in Hidalgo County, with special attention given to abandoned citrus trees. A tree-to-tree examination made of all properties that showed canker in earlier years, resulted in finding that the lower Rio Grande Valley is apparently still free from citrus canker.

Transit-inspection results.--More than 2,300 shipments moving in violation of Federal domestic plant quarantines were intercepted by transit inspectors at 21 stations in the fiscal year 1936, an increase of more than 400 over that of the previous year. These results are due in part to an increase of the inspection force and to the extension of the work to several cities in which the inspection of mail, express, and freight had not been carried on theretofore. Several of the States are cooperating in the work.

CONTROL INVESTIGATIONS

Tropical plants tested as insecticides.--Tests to determine the toxicity of numerous plants and plant products grown in Puerto Rico and other tropical countries are under way, in cooperation with the Bureau of Plant Industry. Over 200 samples have been submitted for testing on mosquito larvae, flies, and leaf-eating insects, and many of the samples have been found to be decidedly toxic. W. N. Sullivan, Beltsville, Md., is carrying on the tests on flies and mosquito larvae.

INSECTICIDE INVESTIGATIONS

New synthetic organic insecticides.--The Division of Insecticide Investigations has synthesized a large number of organic compounds that have been tested by the Division of Control Investigations for their toxicity to mosquito larvae, convenient test insects, in a search for organic insecticides to replace inorganic insecticides that may be hazardous to human health. These compounds are tested by dissolving them in acetone and adding calculated portions of the solution to beakers containing 100 cc of water and 50 mosquito larvae entering the fourth stage. Those concentrations of the various compounds that produced a mortality of 50 percent or higher in 16 hours were considered effective. Some of the most toxic compounds found are: 4-(p-bromophenylazo)-o-cresol, 4-(p-bromophenylazo)-resorcinol, p-bromphenylazophenol, 4-(p-bromophenylazo)-m-cresol, 4-(2.5-dichlorophenylazo)-o-cresol, 6-methylphenothiazine, and phenothioxin. These compounds were synthesized by D. L. Vivian and L. E. Smith of the Division of Insecticide Investigations and were tested on mosquito larvae by D. E. Fink, of the Division of Control Investigations. Notes describing the results of these tests appear in the Journal of Economic Entomology for August 1936.

Bibliography of nicotine.--In 1933 the Division of Insecticide Investigations, in cooperation with the Division of Control Investigations, began abstracting all the literature relating to nicotine. On account of the great number (over 5,000) of articles on nicotine, it was decided to compile abstracts of these in groups according to subject. All references to the literature dealing primarily with the chemistry of nicotine have just been published in mimeographed form under the authorship of R. L. Busbey and N. E. McIndoo as circular E-384. This publication of 257 pages contains 851 abstracts of articles on the physical and chemical properties of nicotine, methods for the determination of nicotine, processes for the extraction of nicotine from tobacco, and the occurrence of nicotine in various species of Nicotiana. An author index and a subject index refer to the abstracts by number. In the introduction to the publication the authors state: "The annual consumption of nicotine as an insecticide in the United States is estimated to be 1,000,000 pounds of the alkaloid, equivalent to

2,500,000 pounds of the ordinary commercial 40-percent solution. Extensive tests by workers in the United States Department of Agriculture and in certain of the State agricultural experiment stations and also by insecticide manufacturers are now under way to find new uses for nicotine and better ways of applying it. In order to assist these investigators a comprehensive bibliography, dealing with all phases of nicotine, has been prepared. On account of the voluminous literature on the subject (over 5,000 references) it was decided to issue the bibliography in sections--one dealing with the chemistry, one with the pharmacology, and one with the use of nicotine as an insecticide. The present publication comprises as far as possible all references to published papers that appeared prior to 1935 and which are of interest primarily from the chemical point of view. Articles which may contain some reference to the chemistry of nicotine but which are chiefly entomological or medical will appear in the appropriate section. To facilitate finding the references relating to any particular phase of the subject, they have been grouped under headings as shown in the table of contents. The arrangement under these headings is chronological by years and alphabetical by authors for each year."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

The taxonomy of the coconut hispids of the genus Brontispa.--Several specimens of the hispid genus Brontispa, reported as a serious pest of coconut in certain of the Pacific islands, have been received from O. H. Swezey, Guam. An attempt by H. S. Barber to identify these involved the study of all available material in the group, as well as the careful examination of nearly 50 widely scattered papers dealing with the various species falling in the Brontispa complex, which are exceedingly injurious in coconut culture. This mass of literature indicates that the taxonomy of the group is very confused. Five different generic names have been used for the several species involved and the specific names have been so misapplied that only a few of the more distinct forms are recognizable as correctly identified. The fact that the types of most of the species are scattered in various European collections adds to the difficulty of proper classification. Nevertheless only a thorough review of the whole situation can make possible the definite establishment of the identity of any given material in this group. This condition is characteristic of numerous taxonomic problems in all the larger orders of insects and emphasizes the desirability of increased opportunity for taxonomic research.

European chalcid parasite of Bruchus brachialis F. in the United States.--Several specimens reared from B. brachialis in vetch seed taken at Salisbury, N. C., were recently submitted by C. C. Hill, of the Division of Cereal and Forage Insect Investigations. They have been identified by A. B. Gahan as Bruchobius mayri Masi and represent the first record of the occurrence of this species in North America.

A new parasite of the coffee leaf miner.--Recently Francisco Sein, Jr., of the University of Puerto Rico at Rio Piedras, submitted for determination a series of 50 specimens of a braconid reared from larvae of the

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coffee leaf miner (Leucoptera coffeella Staint.) in Guadeloupe. The parasite has been identified by C. F. W. Muesebeck as a new species of Mirax, a genus of Microgasterinae. Species of this genus have been known as parasites of lepidopterous leaf miners but have never before been reared in sufficient numbers to indicate that they may be of importance as control agents. This species from the coffee leaf miner in Guadeloupe, however, occurred so abundantly as to suggest that it may prove an important factor in the control of that insect.

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